



IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicants: Frank B. Dean and Fawad Faruqi

Serial No.: 09/514,113 Art Unit: 1646

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For: *METHOD FOR REDUCING ARTIFACTS IN NUCLEIC ACID AMPLIFICATION*

Assistant Commissioner for Patents  
Washington, D.C. 20231

**INFORMATION DISCLOSURE STATEMENT**

Sir:

Pursuant to 37 C.F.R. §1.56 and 37 C.F.R. §1.97, Applicants submit an Information Disclosure Statement, including seven (7) pages of Form PTO-1449 and a copy of each document cited therein.

This Information Disclosure Statement is being filed under 37 C.F.R. § 1.97(b) prior to a first Office Action on the merits. It is believed that no fee is required with this submission. However, should a fee be required, the Commissioner is hereby authorized to charge any required fees to Deposit Account No. 01-2507.

**U.S. Patents**

<u>Number</u>	<u>Issue Date</u>	<u>Patentee</u>	<u>Class/Subclass</u>
5,573,907	11-12-1996	Carrino, et al.	435/006
5,792,607	08-11-1998	Backman, et al.	435/006
5,854,033	12-29-1998	Lizardi	435/091.2
6,001,611	12-14-1999	Will	435/091.2

**Foreign Documents**

<u>Number</u>	<u>Publication Date</u>	<u>Patentee</u>	<u>Country</u>
WO 97/16566 A1	05-06-1997	Smith, et al.	PCT
WO 97/19193 A2	05-29-1997	Lizardi, et al.	PCT
WO 99/18241 A1	04-15-1999	Lizardi	PCT

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### Publications

ASSELINE, et al., "Solid-phase preparation on 5', 3'-Heterobifunctional oligonucleotides using modified solid supports," *Tetrahedron* 48:1233-1254 (1992).

BANÉR, et al., "Signal amplification of padlock probes by rolling circle replication," *Nucleic Acids Res.* 26(22):5073-8 (1998).

BEIGELMAN, et al., "Synthesis of 1-Deoxy-D-Ribofuranase phosphoramidite and the incorporation of abasic nucleotides in stem-loop II of a hammerhead ribozyme," *Bioorganic & Medicinal Chemistry Letters* 4(14):1715-1720 (1994)

BIRKENMEYER & MUSHAHWAR, "DNA probe amplification methods," *J. Virological Methods* 35:117-126 (1991)

BLOCH, et al., "Alpha-anomeric DNA: beta-RNA hybrids as new synthetic inhibitors of *Escherichia coli* RNase H, *Drosophila* embryo RNase H and M-MLV reverse transcriptase," *Gene* 72(1-2):349-60 (1988).

BROWNIE, et al., "The elimination of primer-dimer accumulation in PCR," *Nucleic Acids Res.* 25(16):3235-41 (1997).

COCUZZA, "A phosphoramidite reagent for automated solid phase synthesis of 5'-biotinylated oligonucleotides," *Tetrahedron Lett.* 30:6287-6290 (1989).

COMPTON, "Nucleic acid sequence-based amplification," *Nature*. 350(6313):91-2 (1991).

CONNOLLY, "The synthesis of oligonucleotides containing a primary amino group at the 5'-terminus," *Nucleic Acids Res.* 15(7):3131-9 (1987).

CONNOLLY & RIDER, "Chemical synthesis of oligonucleotides containing a free sulphhydryl group and subsequent attachment of thiol specific probes," *Nucleic Acids Res.* 13(12):4485-502 (1985).

CRAXTON, et al., "Linear amplification sequencing, a powerful method for sequencing DNA," *Methods: A Companion in Methods in Enzymology* 3:20-26 (1991).

DOLINNAYA, et al., "Oligonucleotide circularization by template-directed chemical ligation," *Nucleic Acids Res.* 21(23):5403-7 (1993).

DREYER & DERVAN, "Sequence-specific cleavage of single-stranded DNA: oligodeoxynucleotide-EDTA X Fe(II)," *Proc. Natl. Acad. Sci. U. S. A.* 82(4):968-72 (1985).

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Filed: February 25, 2000

INFORMATION DISCLOSURE STATEMENT

DURAND, et al., "Circular dichroism studies of an oligodeoxyribonucleotide containing a hairpin loop made of a hexaethylene glycol chain: conformation and stability," *Nucleic Acids Res.* 18(21):6353-9 (1990).

EGHOLM, et al., "Peptide Nucleic Acids (PNA). Oligonucleotide Analogues with an Achiral Peptide Backbone," *J. Am. Chem. Soc.* 114:1895-1897 (1992).

FERRIE, et al., "Development, multiplexing, and application of ARMS tests for common mutations in the CFTR gene," *Am. J. Hum. Genet.* 51(2):251-62 (1992).

GRZYBOWSKI, et al., "Synthesis and antibody-mediated detection of oligonucleotides containing multiple 2,4-dinitrophenyl reporter groups," *Nucleic Acids Res.* 21(8):1705-12 (1993).

GUPTA, et al., "A universal solid support for the synthesis of 3'-thiol group containing oligonucleotides," *Tetrahedron Lett.* 31:2471-2474 (1990).

HURYN & OKABE, "AIDS-driven nucleoside chemistry," *Chem. Rev.* 92:1745-1768 (1992).

JABLONSKI, et al., "Preparation of oligodeoxynucleotide-alkaline phosphatase conjugates and their use as hybridization probes," *Nucleic Acids Res.* 14(15):6115-28 (1986).

JONES, et al., "Studies on the alkylation of 2', 3'- $\alpha$ -isopropylideneuridine," *J. Carbohydrates, Nucleosides, Nucleotides* 4:301-6 (1977).

JUN-DONG & LI-HE, "Application of Wittig reaction to adenosine derivatives," *Synthesis* 909-911 (1990).

KALNIK, et al., "NMR studies of abasic sites in DNA duplexes: Deoxyadenosine stacks into the helix opposite the cyclic analogue of 2-Deoxyribose," *Biochemistry* 27:924-931 (1998)

KUMAR, et al., "A simple method for introducing a thiol group at the 5'-end of synthetic oligonucleotides," *Nucleic Acids Res.* 19(16):4561 (1991).

LANDEGRENN, et al., "A ligase-mediated gene detection technique," *Science* 241:1077-1080 (1988).

LANDEGRENN, "Molecular mechanics of nucleic acid sequence amplification," *Trends Genet.* 9(6):199-204 (1993).

LI, et al., "Enzyme-linked synthetic oligonucleotide probes: non-radioactive detection of enterotoxigenic Escherichia coli in faecal specimens," *Nucleic Acids Res.* 15(13):5275-87 (1987).

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Filed: February 25, 2000  
INFORMATION DISCLOSURE STATEMENT

LIZARDI, et al., "Mutation detection and single-molecule counting using isothermal rolling-circle amplification," *Nat. Genet.* 19(3):225-32 (1998).

MACKELLAR, et al., "Synthesis and physical properties of anti-HIV antisense oligonucleotides bearing terminal lipophilic groups," *Nucleic Acids Res.* 20(13):3411-7 (1992).

MATRAY & KOOL, "A specific partner for abasic damage in DNA," *Nature* 399(6737):704-8 (1999).

MORAN, et al., "Non-hydrogen bonding 'terminator' nucleosides increase the 3'-end homogeneity of enzymatic RNA and DNA synthesis," *Nucleic Acids Res.* 24(11):2044-52 (1996).

NELSON, et al., "Oligonucleotide labeling methods. 3. Direct labeling of oligonucleotides employing a novel, non-nucleosidic, 2-aminobutyl-1,3-propanediol backbone," *Nucleic Acids Res.* 20(23):6253-9 (1992).

NELSON, "Rapid detection of genetic mutations using the chemiluminescent hybridization protection assay (HPA): overview and comparison with other methods," *Crit. Rev. Clin. Lab. Sci.* 35(5):369-414 (1998).

NIELSEN, et al., "Sequence-selective recognition of DNA by strand displacement with a thymine-substituted polyamide," *Science* 254(5037):1497-500 (1991).

PIELES & ENGLISCH, "Psoralen covalently linked to oligodeoxyribonucleotides: synthesis, sequence specific recognition of DNA and photo-cross-linking to pyrimidine residues of DNA," *Nucleic Acids Res.* 17(1):285-99 (1989).

PIELES, et al., "Preparation of a novel psoralen containing deoxyadenosine building block for the facile solid phase synthesis of psoralen-modified oligonucleotides for a sequence specific crosslink to a given target sequence," *Nucleic Acids Res.* 17:8967-78 (1989).

RAY & JAXA-CHAMIEC, "Novel thymidine analogues via reaction of unprotected 5'-Deoxy-5'-iodothymidine with dianions," *Heterocycles* 31(10):1777-1780 (1990).

ROBINS & WOUK, "Fluorination at C5' of nucleosides, synthesis of the new class of 5'-Fluoro-5'-S-Aryl (Alkyl) thionucleosides from adenosine," *Tetrahedron Lett.* 29:5729-32 (1988).

SALUNKHE, et al., "Control of folding and binding of oligonucleotides by use of a nonnucleotide linker," *J. Amer. Chem. Soc.* 114:8768-8772 (1992).

SÉQUIN, "Nucleosides and nucleotides. Part 7. Four dithymidine monophosphates with different anomeric configurations, their synthesis and behaviour towards phosphodiesterases," *Helv. Chim. Acta*. 57(1):68-81 (1974).

U.S.S.N.: 09/514,113  
Filed: February 25, 2000  
INFORMATION DISCLOSURE STATEMENT

SINHA & COOK, "The preparation and application of functionalised synthetic oligonucleotides: III. Use of H-phosphonate derivatives of protected amino-hexanol and mercapto-propanol or -hexanol," *Nucleic Acids Res.* 16(6):2659-69 (1988).

SPROAT, et al., "The synthesis of protected 5'-mercapto-2',5'-dideoxyribonucleoside-3'-O-phosphoramidites; uses of 5'-mercapto-oligodeoxyribonucleotides," *Nucleic Acids Res.* 15(12):4837-48 (1987).

STEIN, et al., "Mode of action of 5'-linked cholesteryl phosphorothioate oligodeoxynucleotides in inhibiting syncytia formation and infection by HIV-1 and HIV-2 in vitro," *Biochemistry* 30(9):2439-44 (1991).

STUMP, et al., "The use of modified primers to eliminate cycle sequencing artifacts," *Nucleic Acids Res.* 27(23):4642-8 (1999).

TAKESHITA, et al., "Oligodeoxynucleotides containing synthetic abasic sites. Model substrates for DNA polymerases and apurinic/apyrimidinic endonucleases," *J. Biol. Chem.* 262(21):10171-9 (1987).

TAKASUGI, et al., "Sequence-specific photo-induced cross-linking of the two strands of double-helical DNA by a psoralen covalently linked to a triple helix-forming oligonucleotide," *Proc. Natl. Acad. Sci. U. S. A.* 88(13):5602-6 (1991).

TANAKA, et al., "Cleavage of a nucleosidic oxetane with carbanions: synthesis of a highly promising candidate for anti-HIV agents: A phosphokate isosters O AZI' 5'-phosphate," *Tetrahedron Lett.* 30:2567-2570 (1989)

THOMAS, et al., "Amplification of padlock probes for DNA diagnostics by cascade rolling circle amplification or the polymerase chain reaction," *Arch. Pathol. Lab. Med.* 123(12):1170-6 (1999).

THOUNG & CHASSIGNOL, "Solid phase synthesis of oligo- and oligo-deoxynucleotides," *Tetrahedron Lett.* 29:5905-8 (1988).

WALKER, et al., "Strand displacement amplification--an isothermal, in vitro DNA amplification technique," *Nucleic Acids Res.* 20(7):1691-6 (1992).

WALKER, et al., "Isothermal in vitro amplification of DNA by a restriction enzyme/DNA polymerase system," *Proc. Natl. Acad. Sci. U. S. A.* 89(1):392-6 (1992).

WILL, et al., "The synthesis of oligonucleotides that contain 2,4-dinitrophenyl reporter groups," *Carbohydr. Res.* 216:315-22 (1991).

ZHANG, et al., "Amplification of target-specific, ligation-dependent circular probe," *Gene* 211(2):277-85 (1998).

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Filed: February 25, 2000  
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ZUCKERMANN, et al., "Efficient methods for attachment of thiol specific probes to the 3'-ends of synthetic oligodeoxyribonucleotides," *Nucleic Acids Res.* 15(13):5305-21 (1987).

### Remarks

This statement should not be interpreted as a representation that an exhaustive search has been conducted or that no better art exists. Moreover, Applicants invite the Examiner to make an independent evaluation of the cited art to determine its relevance to the subject matter of the present application. Applicants are of the opinion that their claims patentably distinguish over the art referred to herein, either alone or in combination.

Respectfully submitted,



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Dated: June 21, 2000

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**Certificate of Mailing under 37 C.F.R. § 1.8(a)**

I hereby certify that this Information Disclosure Statement, along with any paper referred to as being attached or enclosed, is being deposited with the United States Postal Service on the date shown below with sufficient postage as first-class mail in an envelope addressed to the Assistant Commissioner for Patents, Washington, D.C. 20231.

Date: June 21, 2000

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